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Assessment of methods for determining field-equivalent sound levels from real-ear and manikin measurements

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11:00

2aNSc7. Research strategies for evaluating effectiveness of industrial hearing loss prevention programs (HLPP). Mary M. Prince, John R. Franks, Carol Merry, and Michael Colligan (Natl. Inst. for Occupational Safety and Health (NIOSH), 4676 Columbia Pkwy., Cincinnati, OH 45226)

NIOSH recommends that hearing loss prevention programs (HLPPs) be implemented for all workers whose unprotected 8-h TWA exposures equal or exceed 85 dB and that the programs include at least the following components: (1) initial and annual audits of procedures, (2) noise exposure assessment, (3) engineering and administrative control of noise exposures, (4) audiometric surveillance and evaluation, (5) use of hearing protectors (for exposures >85 dB, regardless of duration), (6) education and motivation, (7) recordkeeping, and (8) program evaluation. All components except program evaluation and routine in-hour audits are generally discussed in the Occupational Safety and Health Administration (OSHA) Hearing Conservation Amendment (HCA). This paper presents research approaches for systematically evaluating OSHA-mandated hearing conservation programs. The intent of such research is to (a) develop methods for evaluating hearing conservation programs that can be used across several industrial sectors and (b) identify ways in which "hearing conservation" can effectively become "hearing prevention" programs. General approaches are presented for each program element and data collection issues are discussed with specific examples of how various methods can be used for program evaluation. The goal of such research strategies is to identify the best predictors of program effectiveness.

11:20

2aNSc8. Assessment of methods for determining field-equivalent sound levels from real-ear and manikin measurements. Dorte Hammershoei and Henrik Moller (Acoust. Lab., Aalborg Univ., Fredrik Bajers Vej 7 B4, DK-9220 Aalborg O, Denmark)

The usual method of measuring noise with a sound-level meter at the position of the exposed person, but with the person absent, is not applicable for sound sources placed close to the ears. For measurement of the noise emission from such sources, the coupling between the sound source and the ear must be similar to that of the real life situation. This can be achieved by using the microphone in real ear technique (the MIRE technique) or the manikin technique as described in the upcoming ISO 11904, parts 1 and 2, respectively. For evaluation and comparison with traditional criteria, the measured ear or manikin sound-pressure levels are subsequently converted into either free-field or diffuse-field equivalent sound-pressure levels. The uncertainty of the final result depends on the method used. For the MIRE technique, the uncertainty is mainly related to the statistical uncertainty as determined by the variation between humans and the number of subjects used. For the manikin technique, the uncertainty is mainly related to the deviation of the manikin's acoustical characteristics from those of humans. The paper presents an overview of the methods and examples of practical results.

Contributed Poster

This poster will be on display in the Poster Gallery from Monday to Wednesday, 15-17 March. The author will be at the poster from 10:00 a.m. to 12:00 noon on Wednesday, 17 March.

2aNSc9. The confounding influence of collapsing the ear canal on audiological assessment of noise-exposed workers. Michel Picard, Chantale Tremblay, and Veronique Dumont (Ecole d'orthophonie et d'audiologie, Univ. de Montreal, Montreal, QC H3C 3J7, Canada, Picardmi@magellan.umontreal.ca)

Collapsing of the ear canal resulting from using supra-aural earphones has been studied in a group of 52 noise-exposed workers. Prevalence and audiometric manifestations of collapsing the ear canal were determined based on comparison of pure-tone air-conduction thresholds obtained when insert earphones are substituted for supra-aural ones in the same

individuals. Results indicate that as many as 17% of candidates showed in one ear or the other, threshold elevations of 6.6 dB on average at 3 kHz, of 8.1 dB on average at 4 kHz, and of 9 dB on average at 6 kHz as a result of shifting from insert to supra-aural earphones. This finding is of special concern when considering the particular attention paid for the correct positioning of the two types of devices, and the systematic tearing of the tragus in the anterior direction to force the ear canal opening in the positioning of supra-aural earphones. It suggests supra-aural earphones may partially collapse the entrance of the ear canal as a result of the excess pressure applied to the pinna. A model that may help predict the effects of this insidious yet pervasive condition of collapsing ear canals on hearing thresholds of noise-exposed workers will be discussed.